REMARKS

The application includes claims 1-13 and 18-24 prior to entering this amendment.

Claims 1-13 and 18-24 were rejected.

Claims 2-13, 18, 21, 22, and 24 are amended.

Claim 25 is new. No new matter is added.

In the Drawings

Figure 1 is amended to correct a grammatical error associated with reference number S106, where the word "increasing" has been replaced with "increase." Entry of the Replacement sheet including amended Figure 1 is respectfully requested.

Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1-5 and 22 under 35 U.S.C. § 102(e) over Maurer *et al.* (U.S. Patent 6,650,773).

The rejection is traversed. Previously presented claim 1 recites a method for reducing image noise in a scanned image, comprising:

> decreasing a color level of the scanned image by reducing a number of bits of a full color level of one or more pixels in the scanned image to form a reduced color level image;
>
> composing a pattern having less color level than the full color level; and
>
> recombining the full color level of the one or more pixels in the scanned image by combining the reduced color level image with the pattern.

Maurer, on the other hand, is primarily directed to a disparate method of compression of a digital image (Abstract and col. 1 lines 8-10). In Maurer, the digital image is pre-processed and converted into a YCbCr color space 102 prior to subsequent compression of the different color channels 109, 112. The pre-processing is described as removing random noise such as Guassian noise and "salt and pepper" noise of the image. The pre-processing of Maurer is an example of reducing image noise that is known in the art, and as further described in Applicant's specification at paragraph 0007 of the published application.

In rejecting claim 1, the Examiner first refers to the pre-processing step of Maurer to suggest that the method of compression is directed to reducing image noise. Applicant respectfully points out that the optional pre-processing step occurs prior to any of the

compression steps (Fig. 1 and col. 2 lines 14-22). The compression steps may be completed independently of the pre-processing step (col. 2 lines 19-30), since they are directed to the different purposes of removing noise versus image compression.

The Examiner identifies the bit-depth truncation 106 of a luminance channel Y as allegedly disclosing decreasing a color level of the scanned image by reducing a number of bits of a full color level of one or more pixels in the scanned image to form a reduced color level image, as recited by claim 1. Whereas the bit-depth truncation 106 of Maurer does mention discarding visual contouring artifacts, Applicant submits that visual contouring artifacts do not suggest image noise, as recited by claim 1. Rather, the image noise is described as being reduced in the pre-processing step of Maurer as previously mentiond. Accordingly, Applicant respectfully submits that the Examiner's suggestion that the compression method of Maurer is directed to a method for reducing image noise is improper.

The Examiner next identifies the downsampling process 108 of Maurer as allegedly disclosing composing a pattern having less color level than the full color level, as recited by claim 1. A 2x2 matrix of pixels of the downsampling process 108 is purported to disclose the pattern of claim 1. Effectively, the Examiner is making the assertion that the 2x2 matrix of pixels of the downsampling process 108 has less color than a full color level associated with the bit-depth truncation 106 of Maurer. Such an interpretation is not supported by the specification. Applicant respectfully submits that there is no basis for the Examiner's position, and that Maurer does not provide any indication of a relative color level as between the downsampling process 108 and the bit-depth truncation 106. To the contrary, Maurer states that the luminance channel Y in the bit-depth truncation 106 is processed separately from the chrominance channels Cb and Cr in the downsampling process 108 (col. 2 lines 31-32). The processing and compression of the Y and Cb and Cr channels are not only separate, but they are intrinsically different, such that the bit-depth truncation 106 and reduced spatial resolution of the downsampling process 108 are not combinable in the manner suggested by the Examiner.

The Examiner appears to be confusing the terms "bits" with "pixels", and vice versa, or at least not recognizing that they are distinct and different terms. Whereas the bit-depth truncation 106 describes reducing a number of bits (col.2 lines 47-51), the downsampling process 108 describes reducing a number of pixels (col. 2 lines 62-64). Pixel count and pixel

density may be used to define a resolution of an image (col. 2 line 59), whereas each pixel is associated with a number of bits of one or more colors (col. 2 lines 8-13). A reduction of pixels reduces a resolution of an image, whereas a reduction of a number of bits reduces an amount of data associated with defining the color. More to the point, the matrix of pixels associated with the downsampling process 108 of Maurer is unrelated to a color level. A single pixel may have the same color level as a matrix of pixels. Accordingly, Applicant respectfully submits that the Examiner's suggestion that a full color level may obtained by combining the 2x2 block of pixels with a reduced color image is not supported by Maurer.

The Examiner's attention is directed to column 2 lines 58-60, which states, "The downsampling reduces spatial resolution of the chrominance channels, but not the bit depth." Accordingly, even if the chrominance channels Cb and Cr were reconstructed using the 2x2 blocks of pixels (col. 3 lines 37-43), this has no relationship to a bit-depth or color of the image. Rather, the reconstructed chrominance channels are merely interpolated to their original resolution (col. 3 lines 48-50). Furthermore, since the downsampling process 108 is performed separately from the bit-depth truncation 106, Applicant respectfully submits that it is improper to interpret Maurer as combining the 2x2 block of pixels of the downsampling process 108 with a reduced color level image associated with the bit-depth truncation 106.

Applicant further points to the fact that any color loss that occurred during the pre-processing of the image (col. 2 lines 15-30) would not be recovered by reconstruction using either of the lossless or lossy standards of Maurer (col. 3 lines 38-46). Rather, these lossless and lossy standards are only purported to reconstruct the channels due to data loss associated with the bit-depth truncation 106 and downsampling 108 processes. However, as both of these processes 106, 108 occur after the pre-processing step, color loss associated with the noise reduction would not be recovered. This further serves to illustrate that Maurer merely discloses conventional image noise reduction as provided in the Applicant's specification at page [0007] of the published application.

In rejecting claim 2, the Examiner suggests that the bit-depth truncation 106 of Maurer discloses a bit-enhanced method to combine a reduced color level image and a pattern. Maurer describes bit-depth truncation 106 as truncating a number of bits, for example from eight bits to five bits. However, simply reducing a number of bits in a channel fails to disclose that a reduced

color level image and a pattern are combined. The bit-depth truncation 106 is directed to the compression method of Maurer, wherein data is removed to provide for more efficient compression of the image. One skilled in the art would appreciate that the bit-depth truncation of Maurer fails to disclose the bit enhanced method recited by claim 2.

In rejecting claim 3, the Examiner states that combining a reduced color level image of the bit-depth truncated channel Y with the 2x2 matrix of the downsampled channels Cb and Cr restores the one or more pixels to include a same number of bits as before the color level is decreased. As previously argued by the Applicant, Maurer fails to disclose combining the 2x2 matrix with the bit-depth truncated channel Y, rather channel Y is processed separately from channels Cb and Cr (col. 2 lines 31-32). Furthermore, even if the processes could be combined, since the 2x2 matrix of pixels is associated with spatial resolution of channels, it would not be obvious to one skilled in the art how such a combination would restore a number of bits. Increasing a number of pixels does not necessarily have any effect on a color level of the image; rather, the number of pixels instead determines a resolution of the image.

In rejecting claim 5, the Examiner states that the number of bits reduced from the full color level is set to an image noise level, and cites column 2, lines 44-51. The bit-depth truncation 106 is directed to a method of compression, and is described as reducing contouring artifacts (col. 2 lines 45-48), rather than a method for reducing image noise. Image noise level reduction, on the other hand, is described by Maurer as being performed by the optional pre-processing step, wherein features are removed that take too many bits to code (col. 2 lines 15-20). Applicant respectfully submits that the Examiner is improperly combining features of multiple steps of Maurer that are not combinable in the manner proposed. Applicant traverses the rejection of claim 22 for similar reasons.

Accordingly, Applicant respectfully requests withdrawal of the rejection of claims 1-5 and 22.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claims 6-13, 18-21, 23, and 24 under 35 U.S.C. § 103(a) over Maurer.

The rejection is traversed for reasons similar to those provided with respect to claims 1-5 and 22, infra. In addition, claims 6-13, 18-21, 23, and 24 recite further novel features not disclosed by Maurer. For example, amended claim 6 recites a method for reducing noise in an image, comprising:

> reducing an image level of one or more pixels of the image by subtracting a number of bits of image data from each of the one or more pixels; and
>
> restoring the image level of the one or more pixels using a halftone pattern comprising a matrix, wherein a number of rows and a number of columns of the matrix correspond to the number of bits of image data subtracted from the one or more pixels.

The Examiner acknowledged that Maurer fails to disclose wherein the matrix depends on the number of bits (page 5, first paragraph of the Office Action), and instead suggested that by combining the bit-depth truncation 106 and the 2x2 matrix of the downsampling process 108, these features would be obvious. The Applicant respectfully disagrees.

The Applicant notes that under MPEP §2143, an obviousness rejection must disclose one or more references that teach every claim element or would be obviously modified by one skilled in the art to teach every claim element. MPEP §2143 further requires that there be some suggestion in the references or from the prior art as a whole that would motivate one skilled in the art to combine the references, as well as a reasonable expectation of success. This is further supported by the recent *KSR* decision, whereby the Supreme Court acknowledged the importance of identifying "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does" in an obviousness determination. *KSR*, 127 S. Ct. 1727 at 1731 (2007). Additionally, if one of the references 'teaches away' from the combination of references (i.e., teaches away from the missing claim element), it is strong evidence of non-obviousness. The Applicant also points out that claim elements must be read together as a whole rather than in a vacuum. That is, each element must be read in consideration of the other elements in the claim.

As previously argued, a combination of the bit-depth truncation 106 and downsampling process 108 is not only incongruous with the processes being separately performed (col. 2 lines 30-32), but does not logically follow since Maurer's matrix is comprised of pixels and fails to identify or otherwise indicate any relationship to a number of bits reduced in the bit-depth truncation 16 of channel Y. Maurer fails to disclose how the bit-depth truncation 106 and

downsampling process 108 could be combined, or of how the reduced number of bits in the Y channel is related to the matrix of pixels in the Cb and Cr channels in the downsampling process 108. Accordingly, Applicant respectfully submits that the proposed combination of the processes 106, 108 is improper, and is furthermore not obvious in view of Maurer which in faet teaches away from such a combination (col. 2 lines 30-32).

In rejecting claim 7, the Examiner acknowledges that Maurer fails to disclose that the color level of the pattern depends on the number of bits reduced from the full color level (page 5, fourth paragraph of the Office Action). Instead, the Examiner suggests that it would be obvious in view of the bit-depth truncation 106 and downsampling proeess 108. Whereas Maurer describes reducing a number of bits in the bit-depth truncated channel Y, it is a number of pixels that are reduced in the downsampled channels Cb and Cr (col. 2 lines 61-64). According to Maurer, the compression of the downsampled channels Cb and Cr does not result in any loss of the color information in flat areas (col. 3 lines 5-7). Applicant respectfully submits that the Examiner has failed to provide adequate basis for suggesting that the matrix of pixels associated with the downsampling process 108 is in any way dependent or related to a number of bits associated with the Y channel of the bit-depth truncation 106, so as to disclose wherein the color level of the pattern depends on the number of bits reduced from the full color level, as recited by claim 7.

By way of further example, previously presented claim 8 recites a method for reducing noise in an image, comprising:

> reducing a full image level of one or more pixels in the image by decreasing a number of bits according to the image noise;
>
> composing a halftone pattern with a reduced image level corresponding to the decreased number of bits; and
>
> recombining an image level of the one or more pixels in the image using the halftone pattern.

In rejecting claim 8, the Examiner acknowledges that Maurer fails to disclose composing a halftone pattern with a reduced image level corresponding to the decreased number of bits (page 6, third paragraph of the Office Action). From the rejection of claim 2, Applicant assumes that the Examiner is again suggesting that the 2x2 matrix of pixels from the downsampling process 108 discloses the half tone pattern recited by claim 8. However, since the bit-depth truncation 106 is a separate process from that of the downsampling process 108, it would not be

obvious to combine the two processes. Moreover, the Examiner's suggestion that combining the 2x2 matrix would restore "the one or more pixels to include a same number of bits as before the color level is decreased" (page 3, final paragraph of the Office Action) is incompatible with Maurer at column 2, lines 58-59 where "the downsampling reduces spatial resolution of the chrominance channels, but not bit depth." Since downsampling does not reduce bit depth, Applicant respectfully submits that combining the matrix of pixels from the downsampling process 108 would not restore the one or more pixels to include a same number of bits, as suggested by the Examiner. Accordingly, Applicant respectfully submits that the combination proposed by the Examiner is not obvious in view of Maurer.

In rejecting claim 10, the Examiner acknowledges that Maurer fails to disclose wherein the halftone pattern comprises a matrix having a number of rows equal to the decreased number of bits (page 7, third paragraph of the Office Action). Instead the Examiner suggests that it would be obvious in view of the bit-depth truncation 106 and 2x2 matrix of pixels of the downsampling process 108. The 2x2 matrix is explicitly described by Maurer as being comprised of pixels (col. 2 lines 62-64). The number of pixels in the matrix associated with the Cb and Cr channels is unrelated to the number of bits associated with the Y channel. As previously described, the channels are processed separately. Maurer fails to provide any advantage or motivation to include a matrix having a number of rows equal to the decreased number of bits. Additionally, Applicant respectfully submits that the Examiner has failed to provide adequate basis for the proposed combination of the separate processes 106, 108 in the manner suggested.

Accordingly, Applicant respectfully requests withdrawal of the rejection of claims 6-13, 18-21, 23, and 24.

New Claim

New claim 25 recites "The apparatus of claim 18, wherein one or more of the full image level, the reduced image level, and the image level comprise a gray level." Support for new claim 25 may be found at Figure 1, reference number S106, and in paragraph [0030] of the published application, for example.

Any statements made by Examiner that are not addressed by Applicant do not necessarily constitute agreement by the Applicant. In some cases, Applicant may have amended or argued the allowability of independent claims thereby obviating grounds for rejection of the dependent claims.

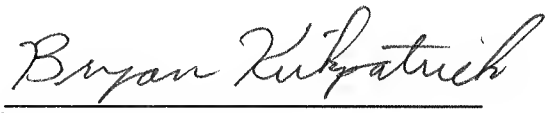
CONCLUSION

For the foregoing reasons, Applicant respectfully requests reconsideration and allowance of claims 1-25. The Examiner is encouraged to telephone the undersigned if it appears that an interview would be helpful in advancing the case.

Customer No. 73552

Respectfully submitted,

STOLOWITZ FORD COWGER LLP



Bryan D. Kirkpatrick
Reg. No. 53,135

STOLOWITZ FORD COWGER LLP
621 SW Morrison Street, Suite 600
Portland, OR 97205
(503) 224-2170

ANNOTATED SHEET
TITLE: METHOD FOR REDUCING IMAGE NOISE
INVENTOR(S): Yin-Chun Huang
ATTORNEY DOCKET NO.: 9585-0439 SERIAL NO. 10/695,327

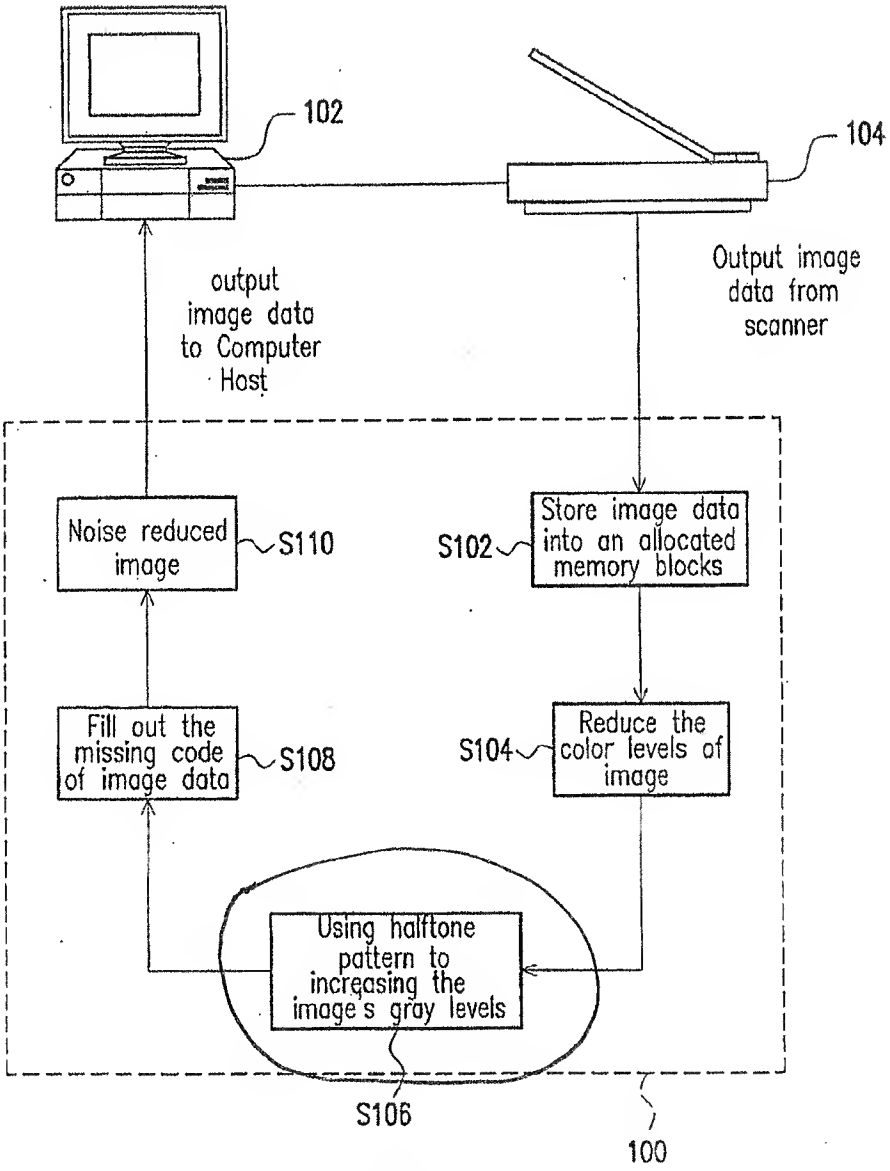


FIG. 1